Journal of Advanced Zoology
ISSN: 0253-7214
Volume 44 Issue 05 Year 2023 Page 1188:1193

An Analysis of the Scavenging Activities of *Rhinacanthus nasutus* (L.) Kurz Leaves in Chloroform Extract

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Abstract

Rhinacanthus nasutus (l.) Kurz was evaluated for its antioxidant activity in this study. *Rhinacanthus nasutus* is a member of the Acanthaceae family. Folk medicine uses it as a remedy for liver disorders, skin disorders, and other pharmacological effects. It was sought to determine the antioxidant activity of *Rhinacanthus nasutus* (L.) Kurz. leaf extract using DPPH assay, H_2O_2, NO and SOD scavenging activity methods. As compared to DPPH, Hydrogen peroxide, Nitric oxide and Sodium oxide, *Rhinacanthus nasutus* leaf extract exhibited better antioxidant activity against Nitric oxide.

INTRODUCTION

As the "Emporium of medicinal plants", India is well known for its medicinal plants. With approximately 12600 species, it is one of the 12 mega biodiversity centers with two hot spots of biodiversity in the Western Ghats and the northeastern region [1]. Traditional medicine provides primary health care to about 80% of the population in developing countries [2]. Many bioactive compounds can be produced by plants. The traditional healthcare systems of traditional societies rely heavily on medicinal plants [3]

This species of *Rhinacanthus nasutus* (L.) Kurz. belongs to the Acanthaceae family. There are several common names for this plant, such as Snake Jasmine, Nagamalli, and Puzhukkolli [4]. An antioxidant is a physiologic substance that acts against excessive oxidative stress and can be found in both endogenous and exogenous sources [5]. Food additives, preservatives, and supplements often contain antioxidants such as BHT, BHA, and plant extracts [6]. It has shown potential effects in treating diseases such as cancer, liver disorders, skin diseases, peptic ulcers, helminthiasis, scurvy, inflammation and obesity in some studies [7].

The aim of this study is to investigate the antioxidant properties of *Rhinacanthus nasutus*. In traditional medicine, different parts of *R. nasutus* have been used to treat conditions such as eczema, pulmonary tuberculosis, herpes, hepatitis, diabetes and hypertension [8]. Antioxidant properties have been reported for *R.nasutus* extracts in foods, cosmetics, and pharmaceuticals. According to [9] extracts of *R. nasutus* in cosmetics may slow aging and hair loss.

MATERIALS AND METHODS

Collection of plant sample

Fresh *Rhinacanthus nasutus* (L.) Kurz leaves were collected from Arumanai region in Vilavankode taluk of Kanyakumari district, Tamilnadu. Plant specimens were deposited in the herbarium of Holy Cross College (Autonomous), Nagercoil after identification.

Preparation of plant extract

Fresh leaves were washed with water and dried in the shade. In the Soxhlet apparatus, 100 grams of powdered leaves were extracted with chloroform. The extract was cooled to room temperature and evaporated under reduced pressure in a rotatory evaporator. After six hours of extraction, the final sample was analysed for GC-MS analysis.

ANTIOXIDANT ANALYSIS OF RHINACANTHUS NASUTUS

Phytochemicals present in plants have a complex structure that makes it possible to evaluate antioxidants in different ways [10]. In addition to DPPH [11], hydrogen peroxide [12], superoxide [13], and nitric oxide [14], various free radical scavengers were evaluated. Rutin is a natural antioxidant called rutoside. Vegetables, fruits, and medicinal herbs are the main sources of this compound. According to [15], rutin has various pharmacological properties including antibacterial, antitumor, anti-inflammatory, antiallergic, antiviral, antiplatelet, and antihypertensive properties.

RESULTS

According to [16] found that free radicals play a role in a wide range of diseases such as neurodegenerative diseases, cancer and HIV/AIDS. Plant extract antioxidant activity can be quantified in different ways; in fact, at least two methods should be used [17]. DPPH provides a quick and easy way to evaluate antioxidants. In DPPH analysis, plants belonging to the Acanthaceae, Leguminosae (subfamilies Papilionoideae and Caesalpinioideae) and Moraceae showed lower activity levels [18].

Rhinacanthus nasutus leaves extracts were highly antioxidant-active against all free radicals. DPPH scavenging activity of *Rhinacanthus nasutus* extract at 100g/mL concentration was the highest of all concentrations. One of the most commonly used methods for evaluating plant extract antioxidant activity is DPPH radical scavenging activity. The standard used was Rutin. In Table 1, different concentrations of plant extract (20-100g/ml), as well as standard Rutin, were tested for their ability to scavenge DPPH. DPPH scavenging activity ranges from low to high. Increasing concentrations of leaf extract showed an increase in scavenging activity. Similar findings have been reported [19,20]

The rutin scavenges more free radicals than the sample extract. As a result, natural antioxidants from plants have been shown to have greater effectiveness in quenching reactive species levels than synthetic individual

dietary antioxidants. Food plants are able to produce food due to the synergistic actions of so many biomolecules. These compounds have antioxidant properties due to their ability to form stable and harmless metabolites from reactive species or to scavenge reactive oxygen and nitrogen species via redox mechanisms [21].

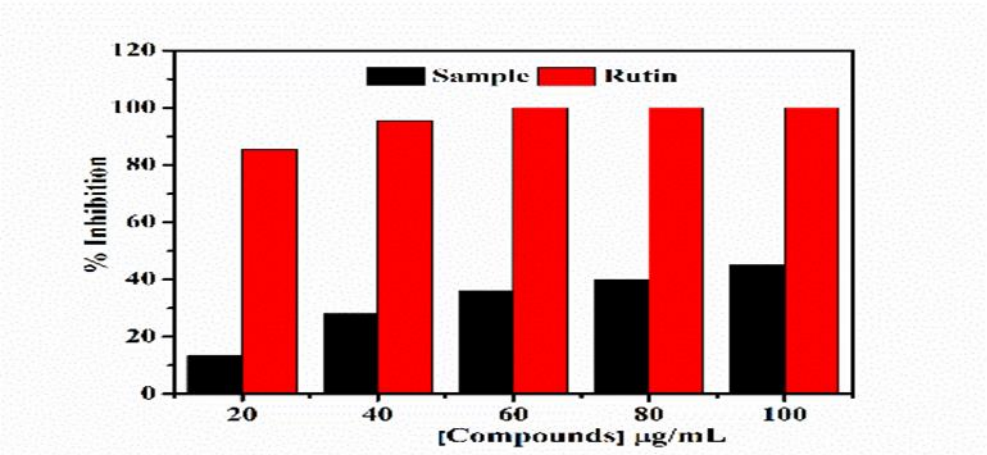

Figure 1. DPPH Free radical scavenging activity of *Rhinacanthus nasutus* (L.)Kurz leaf extract

There was a noticeable difference in scavenging activity between concentrations of 100 g/mL and lower concentrations. There is also evidence that *Mukia maderaspatana* can scavenge H_2O_2 in a dose-dependent manner, and the capacity of scavenging H_2O_2 has been demonstrated [22]. Results showed that plant extracts have minimal H_2O_2 scavenging activities compared to standard Rutin.

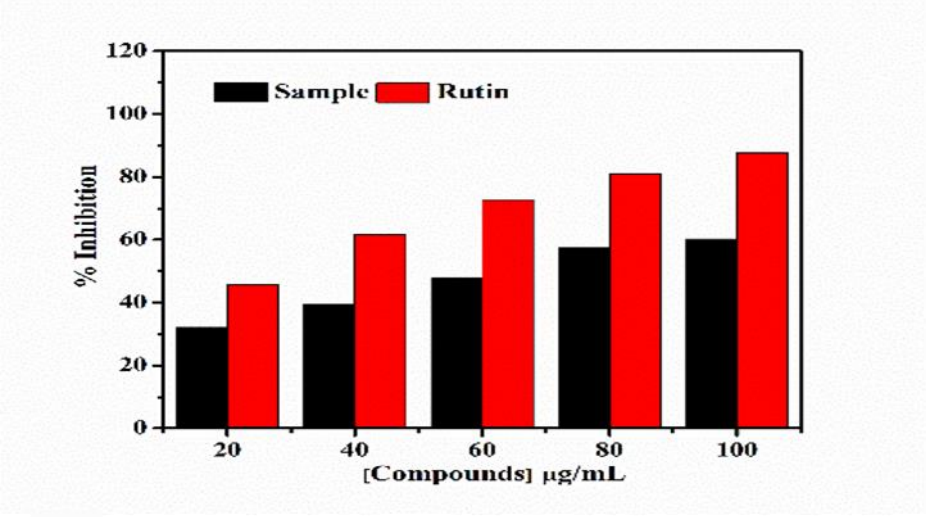

Figure 2. H_2O_2 scavenging activity of *Rhinacanthus nasutus* (L.) Kurz leaf extract NO Scavenging Activity

Inhibition percentages of 68% were found at 100 g/mL concentrations for *Rhinacanthus nasutus* extract. The minimum percentage of inhibition produced was 35.6% at a concentration of 20g/mL. NO plays a number of biological functions, including antimicrobial, antitumor, smooth muscle relaxation, neuronal messenger, inhibition of platelet aggregation, and regulating cell-mediated toxicity [23].

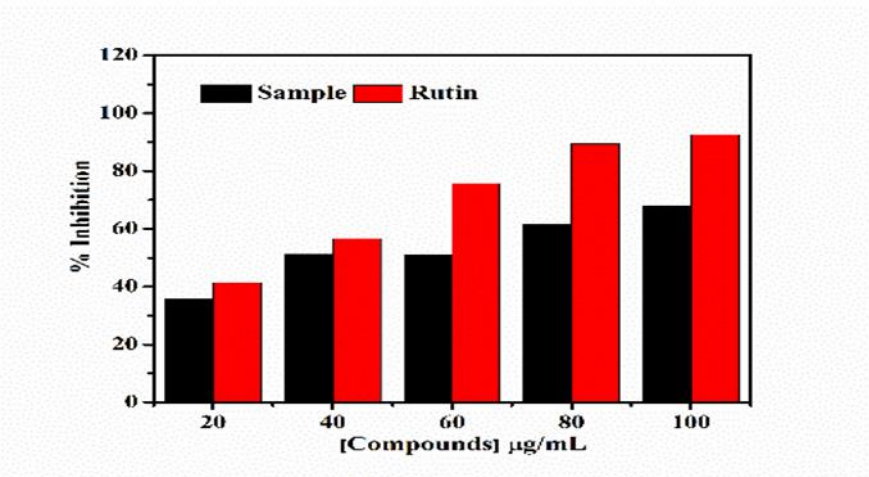

Figure 3. NO scavenging activity of *Rhinacanthus nasutus* (L.) Kurz leaf extract

Scavenging of Superoxide radical

At concentrations of 20 - 100 g/mL, chloroform leaves extract ranges from 19.3% to 48.1%. According to the results, 19.3% of the scavenging activity was observed at 20g/mL while 100g/mL produced the highest scavenging activity. The activity of methanolic extracts of the leaves of *Ocimum sanctum* L. against superoxide radicals is similar to our results [24]. Based on the earlier findings of [25], there are several diseases associated with the scavenging of superoxide radicals, which are reactive oxygen species that damage cells and DNA. A study conducted by [26] demonstrated that flavonoids are effective antioxidants primarily because they scavenge superoxide anions. As shown in figure 3, superoxide radical scavenging activities of the plant extract and reference compound are significantly enhanced by increasing concentrations. In our study Rutin was used as standard. Similarly [27] has used rutin as standard.

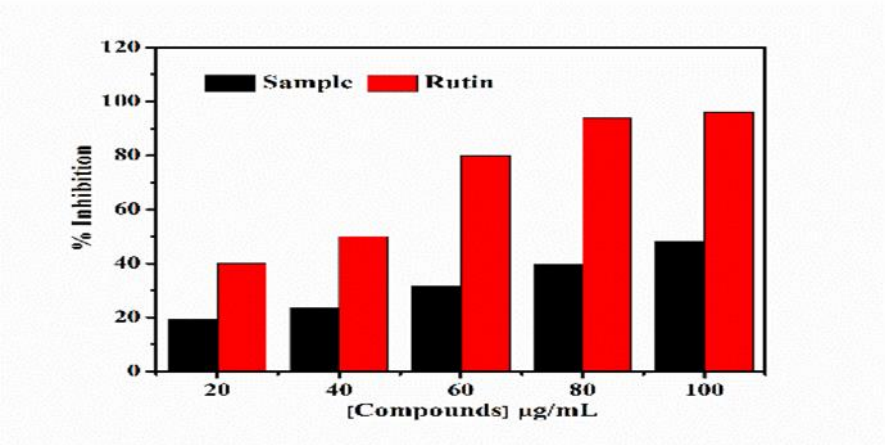

Figure 4.SOD scavenging activity of *Rhinacanthus nasutus* (L.) Kurz leaf extract

Antioxidants are molecules that protect your body from free radical damage. In excess, free radicals can damage the body. In addition to diabetes, heart disease and cancer, they are linked to several illnesses. As a result of free radicals such as superoxide radicals (O_2), antioxidants significantly slow or prevent the oxidative or oxygen-based damage. Hydroxyl radical (OH) and non-free radical species such as H_2O_2 and singlet oxygen ($1O_2$) are associated with cellular and metabolic injury, accelerated aging, cancer, cardiovascular disease, neurodegenerative diseases, and inflammation [28-30].

A perfect example of oxygen free radicals is reactive oxygen species. It is not only free radical molecules found in reactive oxygen species that can affect lipid oxidation, but also non-free radical molecules as well. Reactive oxygen species that are not free radicals include hydrogen peroxide (H_2O_2), hydrochloric acid (HCl), ozone (O_3), and molecular oxygen (O_2) [31]. Research has demonstrated that phytochemicals in common fruits and vegetables can have complementary and overlaid mechanisms of action, including the scavenging of oxidative agents, the stimulation of the immune system, hormone metabolism, and antibacterial and antiviral properties [32]. Due to the toxicity and mutagenic effects of synthetic antioxidants, natural antioxidants have been explored as an alternative [33].

CONCLUSION

Biologically synthesized antioxidants are crucial in preventing and treating chronic diseases by reducing oxidative damage to cellular components caused by free radicals. In vitro antioxidant activity was found to be significantly increased in *Rhinacanthus nasutus* extract in all the investigated types. Hence the present study proves that *Rhinacanthus nasutus* can be further considered in wide manner for its antioxidant property

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